

Application No. 09/976,559
Amendment dated November 12, 2004
Reply to Office Action of July 21, 2004

REMARKS

Claims 1-54 are pending in the application; the status of the claims is as follows:

Claims 28, 29, 31, 32, 41, 42, and 44-46 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,956,304 to Cockrum *et al.* ("Cockrum").

Claims 1, 2, 4, 5, 14, 15, and 17-19 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Cockrum in view of U.S. Patent No. 4,961,098 to Rosbeck *et al.* ("Rosbeck").

Claims 30, 33, 35-40, 43, 47, and 49-54 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Cockrum in view of U.S. Patent No. 5,998,235 to Mitra ("Mitra").

Claims 3 and 16 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Cockrum in view of Rosbeck as applied to claims 1 and 14 above, and further in view of Mitra.

Claims 6, 8-13, 20, and 22-27 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Cockrum in view of Rosbeck and Mitra.

Claims 33, 34, 37, 39, 40, 47, 48, 51, 53, and 54 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Cockrum in view of U.S. Patent No. 4,566,918 to Irvine *et al.* ("Irvine").

Claims 6, 7, 10, 12, 13, 20, 21, 24, 26, and 27 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Cockrum in view of Rosbeck and Irvine.

Drawings

The indication by the Examiner that the drawings submitted on May 4, 2004 have been accepted is noted with appreciation.

35 U.S.C. § 102(b) Rejection

The rejection of claims 28, 29, 31, 32, 41, 42, and 44-46 under 35 U.S.C. § 102(b) as being anticipated by Cockrum, is respectfully traversed based on the following.

Cockrum describes an infrared detector. A passivation layer 18 is formed on a radiation absorption layer 12. The passivation layer is then patterned to provide openings in the passivation layer. In one embodiment, ion milling is used to form the openings. As a byproduct of the ion milling process, a portion of absorption layer is converted to n-type (column 4, lines 51-62) to form n-type regions 14. Contact is made to n-type regions 14 through the openings in the passivation layer to complete the formation of the infrared detection device. Alternatively, the n-type regions may be formed using ion implantation (column 5, lines 3-13).

In contrast to the cited reference, Claim 28 includes the steps of:

forming a patterned doping layer above the passivation layer;
driving dopant from the patterned doping layer into the radiation
absorption layer to form a doped region; ...

The Office Action states that “Cockrum *et al.* teach (column 6, lines 15-62) forming a patterned doping layer (30 in Figs. 4E and 4F) above the passivation layer (18 in Figs 4B-4K) and driving (*i.e.* thermally diffusing) dopant from the patterned doping layer (30 in Figs. 4E and 4F) into the radiation absorption layer (12 in Figs. 4A-4K) to form a doped region (14a or 14b in Figs. 4G-4K).”

Applicant respectfully disagrees with this analysis of the Cockrum reference. In Figure 4E of Cockrum, the doped source layer 30 is not patterned. In Figure 4F, the doped source layer 30 has been patterned due to the removal of mask layer 26. This step removes all of source layer 30 above passivation layer 18. Therefore, Cockrum does not show or suggest “driving dopant from the patterned doping layer,” which is “above the passivation layer.” To anticipate a claim, the reference must show, expressly or

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inherently, every limitation of the claim. MPEP §2131. Therefore, the cited reference does not anticipate claim 28. Claims 29, 31 and 32 are dependent upon claim 28 and thus include every limitation of claim 28. Therefore, claims 29, 31 and 32 are also not anticipated.

Also in contrast to the cited reference, Claim 41 includes a product formed by a process including:

forming a patterned doping layer above the passivation layer;
driving dopant from the patterned doping layer into the radiation
absorption layer; ...

As noted above with regard to claim 28, Cockrum does not show or suggest “driving dopant from the patterned doping layer,” which is “above the passivation layer.” Thus, the cited reference does not show or suggest the above quoted limitation. Therefore, claim 41 is not anticipated by the cited reference. Claims 42 and 44-46 are dependent upon claim 41 and thus are also not anticipated by the cited reference.

Accordingly, it is respectfully requested that the rejection of claims 28, 29, 31, 32, 41, 42, and 44-46 under 35 U.S.C. § 102(b) as being anticipated by Cockrum, be reconsidered and withdrawn.

35 U.S.C. § 103(a) Rejections

The rejection of claims 1, 2, 4, 5, 14, 15, and 17-19 under 35 U.S.C. § 103(a), as being unpatentable over Cockrum in view of Rosbeck, is respectfully traversed based on the following.

As noted in the Office Action, Rosbeck shows the use of a cap layer 16 having a wider bandgap than the underlying radiation absorbing layer 14.

In contrast to the cited references, claim 1 includes:

forming a patterned doping layer above the passivation layer;
driving dopant from the patterned doping layer into the wider
bandgap layer and the radiation absorption layer to form a doped region; ...

As noted above with regard to claim 28, Cockrum does not show or suggest “driving dopant from the patterned doping layer,” which is “above the passivation layer.” Rosbeck also does not show or suggest “driving dopant from the patterned doping layer above the passivation layer.” To support a *prima facie* case for obviousness, the combined references must show or suggest every limitation of the claim. MPEP §2143.03. Because neither of the cited references show or suggest “driving dopant from” a “patterned doping layer above the passivation layer,” the cited references do not support a *prima facie* case for obviousness. Claims 2, 4 and 5 are dependent upon claim 1 and thus include every limitation of claim 1. Therefore, the cited references do not show or suggest every limitation of claims 2, 4 or 5, and thus these claims are also non-obvious.

Also in contrast to the cited references, claim 14 includes a product formed by the process of :

forming a patterned doping layer above the passivation layer;
driving dopant from the patterned doping layer into the wider
bandgap layer and the radiation absorption layer; ...

As noted above, neither Cockrum nor Rosbeck show or suggest “driving dopant from the patterned doping layer,” which is “above the passivation layer.” Because the cited references do not show or suggest every limitation of claim 14, the cited references do not support a *prima facie* case for obviousness of claim 14. Claims 15 and 17-19 are dependent upon claim 14 and thus include every limitation of claim 14. Therefore, the cited references do not show or suggest every limitation of claims 15 and 17-19 and thus these claims are also non-obvious.

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Accordingly, it is respectfully requested that the rejection of claims 1, 2, 4, 5, 14, 15, and 17-19 under 35 U.S.C. § 103(a) as being unpatentable over Cockrum in view of Rosbeck, be reconsidered and withdrawn.

The rejection of claims 30, 33, 35-40, 43, 47, and 49-54 under 35 U.S.C. § 103(a), as being unpatentable over Cockrum in view of Mitra, is respectfully traversed based on the following.

Mitra shows a method for fabricating high quality, tertiary compound semiconductor material having specific characteristics, including the ability to “tune” the material to be absorptive of a selected frequency of infrared light (column 4, lines 6-10).

Claim 30 is dependent upon claim 28 and thus includes every limitation of claim 28. As noted above, the Cockrum reference does not show or suggest “driving dopant from the patterned doping layer,” which is “above the passivation layer.” Mitra similarly does not show or suggest this step and does not suggest this step when combined with the Cockrum reference. Therefore the cited references do not show or suggest every limitation of claim 30 and claim 30 is non-obvious.

In contrast to the cited references, claim 33 includes:

forming a doping layer above the passivation layer;
...
patterning the doping layer;
driving dopant from the patterned doping layer into the radiation
absorption layer to form a doped region; ...

As noted above with regard to claim 30, the cited references do not show or suggest “driving dopant from the patterned doping layer,” which is “above the passivation layer.” Therefore claim 33 is not obvious over the cited references. Claims 35-40 are dependent upon claim 33 and thus include every limitation of claim 33. Therefore, claims 35-40 are also non-obvious.

As noted above with regard to claim 41, Cockrum does not show or suggest a doped region that extends through the passivation layer into the radiation absorption layer. Mitra similarly does not show or suggest this feature and does not suggest this feature when combined with the Cockrum reference. Therefore the cited references do not show or suggest every limitation of claim 43 and claim 43 is non-obvious.

In contrast to the cited references, claim 47 includes:

forming a doping layer above the passivation layer;
...
patterning the doping layer;
driving dopant from the patterned doping layer into the radiation
absorption layer to form a doped region; ...

As noted above with regard to claim 43, the cited references do not show or suggest "driving dopant from the patterned doping layer," which is "above the passivation layer." Therefore claim 47 is not obvious over the cited references. Claims 49-54 are dependent upon claim 47 and thus include every limitation of claim 47. Therefore, claims 49-54 are also non-obvious.

Accordingly, it is respectfully requested that the rejection of claims 30, 33, 35-40, 43, 47, and 49-54 under 35 U.S.C. § 103(a) as being unpatentable over Cockrum in view of Mitra, be reconsidered and withdrawn.

The rejection of claims 3 and 16 under 35 U.S.C. § 103(a), as being unpatentable over Cockrum in view of Rosbeck as applied to claims 1 and 14 above, and further in view of Mitra, is respectfully traversed based on the following.

As noted above with regard to claim 30, the Cockrum reference does not show or suggest "driving dopant from the patterned doping layer," which is "above the passivation layer." Rosbeck also does not show or suggest "driving dopant from the patterned doping layer," which is "above the passivation layer." Mitra similarly does not show or suggest

this step and does not suggest this step when combined with the Cockrum and Rosbeck references. Therefore the cited references, singularly or in combination, do not show or suggest every limitation of claim 30 and claim 30 is non-obvious.

As noted above with regard to claim 41, Cockrum does not show or suggest a doped region that extends through the passivation layer into the radiation absorption layer. Rosbeck also does not show or suggest this feature. Mitra similarly does not show or suggest this feature and does not suggest this feature when combined with the Cockrum and Rosbeck references. Therefore the cited references do not show or suggest every limitation of claim 16 and claim 16 is non-obvious.

Accordingly, it is respectfully requested that the rejection of claims 3 and 16 under 35 U.S.C. § 103(a) as being unpatentable over Cockrum in view of Rosbeck as applied to claims 1 and 14 above, and further in view of Mitra, be reconsidered and withdrawn.

The rejection of claims 6, 8-13, 20, and 22-27 under 35 U.S.C. § 103(a), as being unpatentable over Cockrum in view of Rosbeck and Mitra, is respectfully traversed based on the following.

In contrast to the cited references, claim 6 includes:

forming a doping layer above the passivation layer;
...
patterning the doping layer;
driving dopant from the patterned doping layer into the wider
bandgap layer and the radiation absorption layer to form a doped region; ...

As noted above with regard to claim 3, the Cockrum, Rosbeck and Mitra references, singularly or in combination, do not show or suggest "driving dopant from the patterned doping layer," which is "above the passivation layer." Therefore, claim 6 is non-obvious over the cited references. Claims 8-13 are dependent upon claim 6 and thus include every limitation of claim 6. Therefore, claims 8-13 are also non-obvious.

Also in contrast to the cited references, claim 20 includes:

forming a doping layer above the passivation layer;
...
patterning the doping layer;
driving dopant from the patterned doping layer into the wider
bandgap layer and the radiation absorption layer to form a doped region;...

As noted above with regard to claim 6, the Cockrum, Rosbeck and Mitra references, singularly or in combination, do not show or suggest "driving dopant from the patterned doping layer," which is "above the passivation layer." Therefore, claim 20 is non-obvious over the cited references. Claims 22-27 are dependent upon claim 20 and thus include every limitation of claim 20. Therefore, claims 22-27 are also non-obvious.

Accordingly, it is respectfully requested that the rejection of claims 6, 8-13, 20, and 22-27 under 35 U.S.C. § 103(a) as being unpatentable over Cockrum in view of Rosbeck and Mitra, be reconsidered and withdrawn.

The rejection of claims 33, 34, 37, 39, 40, 47, 48, 51, 53, and 54 under 35 U.S.C. § 103(a), as being unpatentable over Cockrum in view of Irvine, is respectfully traversed based on the following.

In contrast to the cited references, claim 33 includes:

forming a doping layer above the passivation layer;
...
patterning the doping layer;
driving dopant from the patterned doping layer into the radiation
absorption layer to form a doped region; ...

As noted above, the Cockrum reference does not show or suggest "driving dopant from the patterned doping layer," which is "above the passivation layer." Irvine similarly does not show or suggest "driving dopant from the patterned doping layer," which is "above the passivation layer" and does not suggest this step when combined with the

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Cockrum reference. Therefore, the cited references do not support a *prima facie* case for obviousness of claim 33. Claims 34, 37, 39 and 40 are dependent upon claim 33 and thus include every limitation of claim 33. Therefore the cited references do not show or suggest every limitation of claims 34, 37, 39 and 40 and these claims are also non-obvious.

In contrast to the cited references, claim 47 includes:

forming a doping layer above the passivation layer;
...
patterning the doping layer;
driving dopant from the patterned doping layer into the radiation
absorption layer to form a doped region;

As noted above with regard to claim 28, the Cockrum reference does not show or suggest "driving dopant from the patterned doping layer," which is "above the passivation layer." Irvine similarly does not show or suggest "driving dopant from the patterned doping layer," which is "above the passivation layer" and does not suggest this step when combined with the Cockrum reference. Therefore, claim 47 is non-obvious. Claims 48, 51, 53 and 54 are dependent upon claim 47 and thus include every limitation of claim 47. Therefore, the cited references do not show or suggest every limitation of claims 48, 51, 53 and 54 and claims 48, 51, 53 and 54 are also non-obvious.

Accordingly, it is respectfully requested that the rejection of claims 33, 34, 37, 39, 40, 47, 48, 51, 53, and 54 under 35 U.S.C. § 103(a) as being unpatentable over Cockrum in view of Irvine, be reconsidered and withdrawn.

The rejection of claims 6, 7, 10, 12, 13, 20, 21, 24, 26, and 27 under 35 U.S.C. § 103(a), as being unpatentable over Cockrum in view of Rosbeck and Irvine, is respectfully traversed based on the following.

In contrast to the cited references, claim 6 includes:

forming a doping layer above the passivation layer;
...
patterning the doping layer;
driving dopant from the patterned doping layer into the wider
bandgap layer and the radiation absorption layer to form a doped region; ...

As noted above with regard to claim 47, the Cockrum, Rosbeck and Irvine references, singularly or in combination, do not show or suggest "driving dopant from the patterned doping layer," which is "above the passivation layer." Therefore, claim 6 is non-obvious over the cited references. Claims 7, 10, 12 and 13 are dependent upon claim 6 and thus include every limitation of claim 6. Therefore, claims 7, 10, 12 and 13 are also non-obvious.

Also in contrast to the cited references, claim 20 includes:

forming a doping layer above the passivation layer;
...
patterning the doping layer;
driving dopant from the patterned doping layer into the wider
bandgap layer and the radiation absorption layer to form a doped region;...

As noted above with regard to claim 6, the Cockrum, Rosbeck and Irvine references, singularly or in combination, do not show or suggest "driving dopant from the patterned doping layer," which is "above the passivation layer." Therefore, claim 20 is non-obvious over the cited references. Claims 21, 24, 26, and 27 are dependent upon claim 20 and thus include every limitation of claim 20. Therefore, claims 21, 24, 26, and 27 are also non-obvious.

Accordingly, it is respectfully requested that the rejection of claims 6, 7, 10, 12, 13, 20, 21, 24, 26, and 27 under 35 U.S.C. § 103(a) as being unpatentable over Cockrum in view of Rosbeck and Irvine, be reconsidered and withdrawn.

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CONCLUSION

Wherefore, in view of the foregoing amendments and remarks, this application is considered to be in condition for allowance, and an early reconsideration and a Notice of Allowance are earnestly solicited.

This Amendment does not increase the number of independent claims, does not increase the total number of claims, and does not present any multiple dependency claims. Accordingly, no fee based on the number or type of claims is currently due. However, if a fee, other than the issue fee, is due, please charge this fee to Sidley Austin Brown & Wood LLP's Deposit Account No. 18-1260.

Any fee required by this document other than the issue fee, and not submitted herewith should be charged to Sidley Austin Brown & Wood LLP's Deposit Account No. 18-1260. Any refund should be credited to the same account.

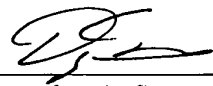
If an extension of time is required to enable this document to be timely filed and there is no separate Petition for Extension of Time filed herewith, this document is to be construed as also constituting a Petition for Extension of Time Under 37 C.F.R. § 1.136(a) for a period of time sufficient to enable this document to be timely filed.

Any other fee required for such Petition for Extension of Time and any other fee required by this document pursuant to 37 C.F.R. §§ 1.16 and 1.17, other than the issue fee,

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